REMARKS

Claims 1-3, 5, 6, 29-31, 33-44, and 46-54 were presented for examination and were rejected. New claim 55 has been added to the instant application. The applicants respectfully request reconsideration in light of the foregoing amendments and the following comments.

35 USC § 103 Rejection of Claims 1-3, 5, 6, 29-31, 33-44, and 46-53

Claims 1-3, 5, 6, 29-31, 33-44, and 46-53 were rejected under 35 USC § 103 as being obvious over the combination of EP 1254645 A1 (hereinafter "Houston") and US Patent No. 6,173,763 (hereinafter "Sano"). The applicants respectfully traverse the rejection for at least the reasons discussed below.

Independent claim 1 recites:

> **1.** An internal formation for a conduit, the formation comprising a longitudinally extending member adapted to extend along an inside surface of at least a portion of the length of the conduit and projecting radially inwardly into the interior of the conduit , *the longitudinally extending member having an asymmetric profile in a direction transverse of the longitudinal axis of the member*, wherein a first surface of the longitudinally extending member is at least partially directed towards an inlet of the conduit and a second surface of the longitudinally extending member is at least partially directed towards the outlet of the conduit and wherein, at each radial cross-section of the conduit along which the longitudinally extending member extends, *the angle that the first surface subtends with a diameter of the conduit extending through a portion of the profile of the longitudinally extending member closest to the radial centre of the conduit is less than 20º*, and wherein the internal formation effects spiral flow of a fluid flowing through the conduit.
>
> ***(emphasis supplied)***

Nowhere do Houston and Sano, whether considered individually or in combination, teach, suggest, or motivate what claim 1 recites — namely, an internal formation for a conduit, the formation comprising:

- the longitudinally extending member having an asymmetric profile in a direction transverse of the longitudinal axis of the member, and
- the angle that the first surface subtends with a diameter of the conduit extending through a portion of the profile of the longitudinally extending member closest to the radial centre of the conduit is less than 20º.

According to the present Action, the Examiner alleges that Houston discloses all the parts of claim 1 except for two limitations; the first being that Houston fails to teach or suggest that the helical insert has one surface subtending with a diameter of the conduit by 20°.

The second limitation that Houston fails to teach or suggest is the feature that the longitudinally extending member has an asymmetric profile in a direction transverse of the longitudinal axis of the member. At page 3 of the present Action, the Examiner states that *"[i]t is well known that asymmetric profiles are used within tubes to provide certain flow characteristics,"* citing to Sano in support of this contention.

However, the applicants respectfully disagree with the Examiner's statement that it would have been obvious for a person skilled in the art to combine the teachings of Houston and Sano in order to arrive at the present invention.

First: As stated by the Federal Circuit in *In re Oetiker*:

> *In order to rely on a reference as a basis for rejection of the applicant's invention, the reference must either be in the field of the applicant's endeavor or, if not, then be reasonably pertinent to the particular problem with which the inventor was concerned. ... [T]he courts have recognized the subjective aspects of determining whether an inventor would reasonably go to the field in which the examiner found the reference, in order to solve the problem confronting the inventor. We have reminded ourselves and the PTO that it is necessary to consider 'the reality of the circumstances' ... in other words, common sense in deciding in which fields a person of ordinary skill would reasonably be expected to look for a solution to the problem facing the inventor. We conclude that the references on which the Board relied were improperly combined. Accordingly, the Board erred in holding the claims unpatentable under section 103.* (*In re Oetiker*, 977 F.2d 1443 (Fed. Cir. 1992))
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> ***(emphasis supplied)***

With respect to the obviousness rejection of claim 1, the Examiner's attempt to combine Houston and Sano to arrive at the determination of obviousness is likewise untenable. This is because the inventions of Houston and Sano are in two entirely different technical fields, with no teaching, suggestion, or motivation to lead a person skilled in the art to combine these two prior art references.

In Houston, it is stated in column 1, lines 3-4 that *"[t]his invention relates inter alia to artificial or modified natural blood-flow tubing."* In particular, tubing that has *"helical-flow inducing means adapted to induce helical flow in such fashion as to eliminate or reduce turbulence"* (Houston at column 1, lines 56-58). For the helical-flow inducing means may be internal helical grooving and/or ridging (Houston at column 2, lines 1-2) in which case the helical formation has a helix angle between 5° and 50° because *"it is thought the [sic] angles above 50° will unduly restrict flow"* (Houston at column 2, lines 30-32). Thus Houston is concerned primarily with the medical field in order to confer helical flow on fluids, in particular blood, passing through tubing in order to reduce or eliminate turbulence.

In contrast, Sano relates to *"heat exchanger tubes used in the construction of heat exchangers, air conditioning and refrigeration systems"* (Sano at column 1, lines 11-14). In particular, Sano addresses the issue of improving heat transfer of heat exchanger tubes. It is noted that tubes provided with inner fins improve their heat transfer coefficient (Sano at column 2, lines 54-55). However, it notes that there are *"practical problems associated with the manufacture of the heat exchange tubes and assembly of the tubes into the heat exchanger"* (Sano at column 3, lines 1-4). These problems are summarized in column 3, lines 5-27 but in essence they are that during expansion of the heat exchanger tube, the inner fins can become "mashed and deformed" and this deformation may "interfere with the flow of refrigerant in the tube." Thus the problem to be solved by the invention of Sano is to avoid deformation of the inner fins so as to avoid increased inflow resistance and maintain high refrigerant flow rates in order to maintain the operation on efficiency of the refrigerating circuit. This is the primary problem that is addressed by Sano's invention.

The applicants acknowledge that there is a disclosure of a heat exchanger tube with an asymmetric cross-section in Sano (see the embodiment shown in Figure 10 of Sano). However, the purpose of the fins being asymmetrical is so that *"the flow resistances are different for different flow directions through the tube"* (Sano at column 3. lines 62-64).

Thus, Houston and Sano not only relate to different technical fields (i.e., blood flow tubing as compared with heat exchangers), but the problems that they address are also different. That is, Houston is concerned with avoiding turbulence, whereas Sano, insofar as it relates to fins of asymmetrical cross section, is concerned with achieving different flow resistances for different flow directions of refrigerant through a tube. The precise reasons why flow resistances are desired in different flow directions is not explicitly stated in Sano but, in view of the general discussion of the state of the art in column 2 and column 3 of

Sano, a skilled person would understand it to improve heat exchange efficiencies, which are clearly and absolutely irrelevant to the considerations in Houston.

Second: As stated by the Federal Circuit in *In re Fritch*:

> *The mere fact that the prior art may be modified in the manner suggested by the Examiner does not make the modification obvious unless the prior art suggested the desirability of the modification. ... It is impermissible to use the claimed invention as an instruction manual or "template" to piece together the teachings of the prior art so that the claimed invention is rendered obvious. This court has previously stated that one cannot use hindsight reconstruction to pick and choose among isolated disclosures in the prior art to deprecate the claimed invention.* (*In re Fritch*, 972 F.2d 1260 (Fed. Cir. 1992))
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> ***(emphasis supplied)***

With this in mind, in Houston, there is clearly and absolutely no desire for different flow directions of fluid through tubing. That is to say, blood flow travels in only one direction through the human and animal body and medical equipment and thus allowance for different flow resistances in different flow directions would be entirely irrelevant to a skilled person considering Houston. Accordingly, it is respectfully submitted that it would not be obvious for a person skilled in the art to combine Houston with Sano.

Furthermore, even if a person skilled in the art were to consider such a combination, Sano actually *teaches away* from such a combination providing an improvement. In particular, it is acknowledged in column 9, lines 3-4 of Sano that flow in one of the directions in the embodiment with asymmetric fin cross-sections results in "a chaotic current of the refrigerant." This is entirely inconsistent with the aims of Houston, which is to "eliminate or reduce turbulence" (Houston at column 1, lines 57-58).

In addition, there is an inconsistency between the teachings of Sano and Houston which it would not have been obvious for a skilled person to resolve if the skilled person were contemplating combining the disclosure of the two prior art documents. More specifically, the helical grooving or ridging in Houston is provided in order to confer helical flow and a helix angle of the grooving or ridging is disclosed as being in the range of 5° to 50°, with about 16° being exemplary (Houston at column 2, line 26). In contrast, in Sano, the purpose of the fins is to increase the surface area in order to improve the heat transfer coefficient of the tube (Sano at column 2, lines 6-64). Thus, in fact, in order to achieve one

of the objects of Sano (namely, having a high heat transfer coefficient (Sano at columns 3, lines 33-34), a higher helix angle (equal to or greater than 30°, see column 4, lines 1-2 of Sano) and therefore a greater number of revolutions of fins would be desirable rather than the relatively low helix angle (for example 16°) that is considered desirable in Houston. Since the purpose of the fins in Houston and Sano are completely different, it is not obvious how a person skilled in the art would resolve this practical inconsistency in order to combine with the teachings of these two prior art documents.

Since there is no teaching or suggestion, let alone motivation, to combine Houston with Sano in the manner suggested by the Examiner, it is respectfully submitted that the Examiner used the applicants' specification as a template or instruction manual to combine the references in order to arrive at the determination of obviousness — i.e., hindsight construction. As stated by the Federal Circuit in *In re Fritch*, *"[i]t is impermissible to use the claimed invention as an instruction manual or "template" to piece together the teachings of the prior art so that the claimed invention is rendered obvious."*

For at least the reasons discussed above, claim 1 is allowable over Houston and Sano, whether considered individually or in combination.

Since claims 2, 3, 5, 6, 29-31, 33-44, and 46-53 depend on claim 1, and because claim 1 is believed to be allowable for the reasons presented, these dependent claims are likewise allowable. Moreover, the recitation of additional patentable features recited in these dependent claims provides an additional basis for their patentability.

Third: In addition to being allowable based on its dependency on claim 1, claim 31 recites additional patentable features that are neither taught nor suggested by Houston and Sano, as further discussed below.

The Examiner considers that claim 31 refers to the identification of an optimum value. However claim 31 specifies that the angle with which the first surface of the formation subtends to the diameter is smaller than that of the second surface. This is not an optimum value, but an important feature that leads to the advantageous helical and non-turbulent flow of the present invention. Importantly, Sano does not disclose this feature; in column 8, line 64 – column 9, line 4, it is stated that a chaotic current is caused by the steeper side facing towards the fluid inlet. Thus, following the teaching of Sano, it would be completely illogical for a person skilled in the art to position the surfaces of the insert as

specified in claim 31 in order to minimize turbulence. As such, the feature of claim 31 is also novel and non-obvious in light of Houston and Sano's disclosure.

35 USC § 103 Rejection of Claim 54

Independent claim 54 was also rejected under 35 USC § 103 as being obvious over the combination of Houston and Sano. The applicants respectfully traverse the rejection for at least the reasons discussed below.

Independent claim 54 recites:

> **54.** An internal formation for a conduit, the formation comprising a longitudinally extending member adapted to extend along an inside surface of at least a portion of the length of the conduit and projecting radially inwardly into the interior of the conduit , *the longitudinally extending member having an asymmetric profile in a direction transverse of the longitudinal axis of the member*, wherein a first surface of the longitudinally extending member is at least partially directed towards an inlet of the conduit and a second surface of the longitudinally extending member is at least partially directed towards an outlet of the conduit, and wherein the first and second surfaces extend from the inside surface of the conduit towards each other and are coupled together at an apex or by a curved third surface, and *wherein, at each radial cross-section of the conduit along which the longitudinally extending member extends the angle that the first surface subtends with a diameter of the conduit extending through a portion of the profile of the longitudinally extending member closest to the radial centre of the conduit is less than 20º*, and wherein the internal formation effects spiral flow of a fluid flowing through the conduit.
>
> ***(emphasis supplied)***

Independent claim 54 is allowable over Houston and Sano for essentially the same reasons as claim 1. Namely, these references, whether considered individually or in combination, fail to teach, suggest, or motivate an internal formation for a conduit, the formation comprising:

- the longitudinally extending member having an asymmetric profile in a direction transverse of the longitudinal axis of the member, and
- wherein, at each radial cross-section of the conduit along which the longitudinally extending member extends the angle that the first surface subtends with a diameter of the conduit extending through a portion of the profile of the longitudinally extending member closest to the radial centre of the conduit is less than 20º.

For at least the reasons discussed above, with respect to claim 1, the applicants respectfully submit that claim 54 is allowable over Houston and Sano.

New Claim 55

Since claim 55 depends on claim 1, and because claim 1 is believed to be allowable for the reasons presented, this dependent claims is likewise allowable. Moreover, the recitation of additional patentable features recited in this dependent claim provides an additional basis for its patentability.

In addition to being allowable based on its dependency on claim 1, claim 55 recite additional patentable features that are neither taught nor suggested by Houston and Sano, as further discussed below.

New claim 55 recites:

> **55.** A conduit according to claim 1, wherein the conduit is formed from one of a *thermoplastic and thermosetting plastic*.
>
> ***(emphasis supplied)***

Support for claim 55 can be found at page 6, lines 18-19 of the Substitute Specification filed on March 15, 2011. As disclosed in this Substitute Specification, *"[t]he helical formation 12 could be formed by any conventional means, such as described in UK Patent Application No. 2369797."* This UK patent application refers to a conduit that is formed from a thermoplastic or thermosetting plastic at page 2, lines 11-12.

Claim 55 is also differentiated over Sano because Sano explains in column 1, lines 31-39, that heat exchangers are made of a high heat conductivity material, such as copper or aluminum. Plastics, such as those from which the conduit of claim 55 is made, are heat insulators.

The reference, Houston, fails to cure the deficiencies of Sano discussed above. As a consequence, claim 55 is allowable over Houston and Sano, whether considered individually or in combination.

No Waiver

All of the applicants' arguments are without prejudice or disclaimer. The applicants reserve the right to discuss the distinctions between the applied art and the claims in a later Response or on Appeal, if appropriate. By not responding to additional statements made by the Office, the applicant does not acquiesce to the Office's additional statements. The distinctions discussed by the applicants above are sufficient to traverse or overcome the rejections.

Request for Reconsideration Pursuant to 37 § CFR 1.111

Having responded to each and every ground for objection and rejection in the last Office Action, the applicant respectfully requests reconsideration of the instant application pursuant to 37 CFR § 1.111 and request that the Examiner allow all of the pending claims and pass the application to issue.

If there are remaining issues, the applicant respectfully requests that Examiner telephone the applicants' attorney so that those issues can be resolved as quickly as possible.

Respectfully,
John Graeme Houston et al.

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